

Taxon: <i>Pluchea carolinensis</i>	Family: Asteraceae
Common Name(s): cattletongue cure-for-all shrubby fleabane sourbush stinking fleabane sweet-scent tabat-diable wild tobacco	Synonym(s): <i>Conyza carolinensis</i> Jacq. (basionym) <i>Pluchea odorata</i> auct. nonn. <i>Pluchea symphytifolia</i> auct.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 11 May 2015
WRA Score: 16.0	Designation: H(Hawai'i)	Rating: High Risk

Keywords: Weedy Shrub, Aromatic, Hybridizes, Thicket-forming, Wind-dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	n
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	y
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		

Qsn #	Question	Answer Option	Answer
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	y
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people		
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	n

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Hanelt, P. (ed.). 2001. Mansfeld's Encyclopedia of Agricultural and Horticultural Crops, Volume 4. Springer-Verlag, Berlin, Heidelberg, New York	No evidence

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 10 May 2015]	"Native: NORTHERN AMERICA Southeastern U.S.A.: United States - Florida [s. & c.] Northern Mexico: Mexico - Baja California, Coahuila, Nuevo Leon, San Luis Potosi, Sinaloa, Tamaulipas Southern Mexico: Mexico - Chiapas, Colima, Guerrero, Hidalgo, Jalisco, Michoacan, Morelos, Nayarit, Oaxaca, Puebla, Queretaro, Tabasco, Veracruz, Yucatan SOUTHERN AMERICA Caribbean: Anguilla; Antigua and Barbuda; Aruba; Bahamas; Barbados; Bermuda; Cayman Islands; Cuba; Dominica; Guadeloupe; Hispaniola; Jamaica; Martinique; Montserrat; Netherlands Antilles - Curacao; Puerto Rico; St. Kitts and Nevis - St. Kitts; St. Lucia; St. Vincent and Grenadines - St. Vincent; Virgin Islands (British); Virgin Islands (U.S.) Mesoamerica: Belize; Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua Northern South America: Venezuela"

Qsn #	Question	Answer
202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 10 May 2015]	

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"A minimum of about 1000 mm of mean annual precipitation is required in upland sites, but it grows in much drier climates along streams and near mangroves and marshes. Cure-for-all may be found from near sea level to 1,000 m in elevation in Hawaii (University of Hawaii Botany 2002)."
	Smith, C.W. 1985. Impact of Alien Plants on Hawaii's Native Biota. Pp. 180-250 in Stone & Scott (eds.). Hawaii's terrestrial ecosystems: preservation & management. CPSU, Honolulu, HI	"It is found on all major islands from sea level to 1,000 m elevation."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes

Qsn #	Question	Answer
	<p>USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 10 May 2015]</p>	<p>"Native: NORTHERN AMERICA Southeastern U.S.A.: United States - Florida [s. & c.] Northern Mexico: Mexico - Baja California, Coahuila, Nuevo Leon, San Luis Potosi, Sinaloa, Tamaulipas Southern Mexico: Mexico - Chiapas, Colima, Guerrero, Hidalgo, Jalisco, Michoacan, Morelos, Nayarit, Oaxaca, Puebla, Queretaro, Tabasco, Veracruz, Yucatan SOUTHERN AMERICA Caribbean: Anguilla; Antigua and Barbuda; Aruba; Bahamas; Barbados; Bermuda; Cayman Islands; Cuba; Dominica; Guadeloupe; Hispaniola; Jamaica; Martinique; Montserrat; Netherlands Antilles - Curacao; Puerto Rico; St. Kitts and Nevis - St. Kitts; St. Lucia; St. Vincent and Grenadines - St. Vincent; Virgin Islands (British); Virgin Islands (U.S.) Mesoamerica: Belize; Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua Northern South America: Venezuela Naturalized: ASIA-TEMPERATE Eastern Asia: Japan - Ryukyu Islands; Taiwan ASIA-TROPICAL North Indian Ocean: British Indian Ocean Terr - Diego Garcia PACIFIC North-Central Pacific: U.S. Outlying Islands - Johnston Atoll, Midway Islands; United States - Hawaii Northwestern Pacific: Marshall Islands; Northern Mariana Islands; Palau; U.S. Outlying Islands - Wake Island South-Central Pacific: French Polynesia; Kiribati - Line Islands Southwestern Pacific: Kiribati - Gilbert Islands, Phoenix Islands; Nauru; New Caledonia; Tonga; Vanuatu; Wallis and Futuna Islands"</p>

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	<p>USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 10 May 2015]</p>	<p>"Naturalized: ASIA-TEMPERATE Eastern Asia: Japan - Ryukyu Islands; Taiwan ASIA-TROPICAL North Indian Ocean: British Indian Ocean Terr - Diego Garcia PACIFIC North-Central Pacific: U.S. Outlying Islands - Johnston Atoll, Midway Islands; United States - Hawaii Northwestern Pacific: Marshall Islands; Northern Mariana Islands; Palau; U.S. Outlying Islands - Wake Island South-Central Pacific: French Polynesia; Kiribati - Line Islands Southwestern Pacific: Kiribati - Gilbert Islands, Phoenix Islands; Nauru; New Caledonia; Tonga; Vanuatu; Wallis and Futuna Islands"</p>

Qsn #	Question	Answer
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnoid descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"The species has naturalized in Hawaii, Guam and other Pacific Islands, Taiwan, West Africa, and probably in many other places in the tropics (Peng and others 1998, Pacific Islands Ecosystems at Risk 2002, Stevens and others 2001)."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"in Hawai'i naturalized usually in relatively dry, coastal areas but ranging up to ca. 900 m in mesic to wet forest, on Kure Atoll, Midway Atoll, French Frigate Shoals, and all of the main islands. First collected on O'ahu in 1931 (Mirikitani s.n., BISH)."
	Wu, Z. Y., Raven, P. H. & Hong, D. Y., (eds.). 2011. Flora of China Volume 20-21 (Asteraceae). Science Press, Beijing & Missouri Botanical Garden Press, St. Louis	"Naturalized in disturbed ruderal sites, often on barren mudstone slopes or associated with scrubby vegetation along roads; below 100– 200 m. Taiwan [native to warmer regions of the New World and W Africa]."
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/ . [Accessed 10 May 2015]	"Naturalized: ASIA-TEMPERATE Eastern Asia: Japan - Ryukyu Islands; Taiwan ASIA-TROPICAL North Indian Ocean: British Indian Ocean Terr - Diego Garcia PACIFIC North-Central Pacific: U.S. Outlying Islands - Johnston Atoll, Midway Islands; United States - Hawaii Northwestern Pacific: Marshall Islands; Northern Mariana Islands; Palau; U.S. Outlying Islands - Wake Island South-Central Pacific: French Polynesia; Kiribati - Line Islands Southwestern Pacific: Kiribati - Gilbert Islands, Phoenix Islands; Nauru; New Caledonia; Tonga; Vanuatu; Wallis and Futuna Islands"
	Nelson, G. 1996. The Shrubs and Woody Vines of Florida: A Reference and Field Guide. Pineapple Press Inc, Sarasota, FL	"This plant is sometimes considered native but was probably introduced from Mexico."

302	Garden/amenity/disturbance weed	
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnoid descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	[A disturbance-adapted weed with negative impacts on agriculture & native species. See 3.03 & 3.04] "It is common in disturbed areas such as construction sites, riverbanks, the margins of hammocks, road cuts and fill, vacant lots, eroded sites, landslides, burned areas, and abandoned fields."

303	Agricultural/forestry/horticultural weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Environmental impact: Displaces forages in pastures and natives in natural areas."
	Hannaway, D.B. & Fribourg, H.A. (eds.). 2011. Country Pasture/Forage Resources Profiles. United States of America. FAO, Rome, Italy	"Weeds are the major pest management concern for pastoral systems in Hawaii. ... The major weed species are the trees guava (<i>Psidium guajava</i>), Christmas berry (<i>Schinuster binthifolius</i>), and faya tree (<i>Myrica fava</i>); the shrubs lantana (<i>Lantana camara</i>), apple of Sodom (<i>Solanum linnaeanum</i>), yellow Himalayan raspberry (<i>Rubus ellipticus</i>), sourbush (<i>Pluchea carolinensis</i>), downy rosemyrtle (<i>Rhodomyrtus tomentosa</i>), gorse (<i>Ulex europaeus</i>), and blackberry (<i>Rubus argutus</i>); the herbs and vines Madagascar fireweed (<i>Scenecio madagascariensis</i>) (Figure 5.2.30) and Koster's curse (<i>Clidemia hirta</i>); and the grasses fountaingrass (<i>Pennisetum setaceum</i>), and tufted beardgrass (<i>Schizachrium condensatum</i>) and broomsedge (<i>Andropogon virginicus</i>)."

304	Environmental weed	Y
	Source(s)	Notes
	U.S. Fish and Wildlife Service. 2007. <i>Chamaesyce celastroides</i> var. <i>kaenana</i> (Akoko). 5-Year Review. U.S. Fish and Wildlife Service Pacific Islands Fish and Wildlife Office, Honolulu, HI	"Competition from and habitat degradation by invasive nonnative plant species is a major threat to <i>Chamaesyce celastroides</i> var. <i>kaenana</i> (Factors A and E). The primary invasive nonnative plant species impacting <i>C. celastroides</i> var. <i>kaenana</i> include <i>Acacia confusa</i> (Formosan koa), <i>Grevillea robusta</i> (silk oak), <i>Hyptis pectinata</i> (comb hyptis), <i>Leucaena leucocephala</i> (koa haole), <i>Melinis repens</i> (natal redtop), <i>Panicum maximum</i> (Guinea grass), <i>Pluchea carolinensis</i> (sourbush), and <i>Schinus terebinthifolius</i> (Christmas berry)"
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Displaces forages in pastures and natives in natural areas."
	US Fish and Wildlife Service. 2012. Endangered and Threatened Wildlife and Plants; Listing 15 Species on Hawaii Island as Endangered and Designating Critical Habitat for 3 Species; Proposed Rule. Federal Register / Vol. 77, No. 201: 63928-64018	"Nonnative plant species that threaten <i>Bidens hillebrandiana</i> ssp. <i>hillebrandiana</i> , the only plant species proposed for listing in this rule that inhabits the coastal ecosystem on Hawaii Island, include the understory and subcanopy species <i>Pluchea carolinensis</i> (sourbush), <i>P. indica</i> (Indian fleabane), <i>Lantana camara</i> (lantana), and <i>Melastoma</i> spp. (Perlman and Wood 2006, in litt.; Bio 2011, pers. comm.)." ... " Nonnative plant species that threaten <i>Bidens micrantha</i> ssp. <i>ctenophylla</i> , the only plant species proposed for listing in this rule that inhabits the lowland dry ecosystem on Hawaii Island include the understory and subcanopy species <i>Lantana camara</i> , <i>Leucana leucocephala</i> (koa haole), <i>Pluchea carolinensis</i> , and <i>P. indica</i> (HBMP 2010b)." ... " <i>Pluchea</i> spp. are 3- to 6-ft (1- to 2-m) tall, fast-growing shrubs that form thickets in dry habitats and can tolerate saline conditions. <i>Pluchea carolinensis</i> (sourbush) is native to Mexico, the West Indies, and South America (Wagner et al. 1999h, p. 351), and <i>Pluchea indica</i> (Indian fleabane), is native to southern Asia (Wagner et al. 1999h, p. 351)."

Qsn #	Question	Answer
	U.S. Fish and Wildlife Service. 2008. <i>Labordia triflora</i> (Kamakahala) 5-Year Review. U.S. Fish and Wildlife Service Pacific Islands Fish and Wildlife Office, Honolulu, HI	"The major threats to <i>Labordia triflora</i> include ... habitat degradation by and competition from invasive introduced plant species, including ... <i>Pluchea carolinensis</i> (sourbush), ..."
	US Fish and Wildlife Service. 2003. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for Three Plant Species From the Island of Lanai, Hawaii; Proposed Rule Vol. 68, No. 6: 1220-1274	[Competes with & threatens two endangered plants on Lanai] "The threats to <i>Abutilon eremitopetalum</i> are habitat degradation and competition by encroaching nonnative plant species such as <i>Lantana camara</i> (lantana), <i>Leucaena leucocephala</i> (koa haole), and <i>Pluchea carolinensis</i> (sourbush);" ... " <i>Cyrtandra munroi</i> ... The threats to this species on Lanai are browsing and habitat disturbance by axis deer; competition with the nonnative plant species <i>Leptospermum scoparium</i> , <i>Melinis minutiflora</i> (molasses grass), <i>Myrica faya</i> , <i>Paspalum conjugatum</i> (Hilo grass), <i>Pluchea carolinensis</i> , <i>Psidium cattleianum</i> , or <i>Rubus rosifolius</i> (thimbleberry);"
	US Fish and Wildlife Service. 2000. Endangered and Threatened Wildlife and Plants; Determinations of Whether Designation of Critical Habitat Is Prudent for 81 Plants and Proposed Designations for 76 Plants From the Islands of Kauai and Niihau, Hawaii. Federal Register Vol. 65, No. 216: 66808-66885	<i>Pluchea carolinensis</i> competes with and is listed among the primary threats to four endangered plant taxa: <i>Cyanea undulata</i> , <i>Dubautia pauciflorula</i> , <i>Hedyotis st.-johnii</i> & <i>Lipochaeta micrantha</i> .

305	Congeneric weed	y
	Source(s)	Notes
	Haselwood, E.L., Motter, G.G., & Hirano, R.T. (eds.). 1983. Handbook of Hawaiian Weeds. University of Hawaii Press, Honolulu, HI	"Found along the coast in salt marshes and in coral fi ll sand plains. A weed in wastelands, postures, and rangelands." ... "Grows fast. Of no forage value."
	Smith, C.W. 1985. Impact of Alien Plants on Hawaii's Native Biota. Pp. 180-250 in Stone & Scott (eds.). Hawaii's terrestrial ecosystems: preservation & management. CPSU, Honolulu, HI	" <i>Pluchea indica</i> " ... "The problems associated with this species are similar to <i>P. odorata</i> . This plant is confined to lowland habitats, particularly wetlands and fishponds. There is a major infestation at Kanaha pond, Maui."
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	" <i>Pluchea indica</i> " ... "Environmental impact: Displaces forages in coastal pastures and natives in marshes and saline areas. Destroys habitat of water birds."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Flora of North America Editorial Committee. 2006. Flora of North America: North of Mexico. Magnoliophyta: Asteridae, part 6: Asteraceae, part 1. Oxford University Press, Oxford, UK	"Subshrubs, 100–400 cm; tap-rooted. Stems matted-villous with viscid, vitreous hairs, proximally glabrescent, not evidently glandular. Leaves petiolate (petioles 10–40 mm); blades (thickish, strongly bicolor) elliptic to oblong-obovate or ovate, 5–16(–20) × 2–6(–8) cm, margins entire or denticulate (teeth callous-tipped), abaxial faces moderately or sparsely matted-villous to crinkly puberulent, adaxial (green) glabrate."
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence] "Erect, many-branched, aromatic shrubs 15-40 dm tall, glandular tomentose, sometimes merely glandular. Leaves dull grayish green on upper surface, lower surface pale, elliptic to narrowly ovate or oblong-obovate, 5-20 cm long, 2-8 cm wide, lower surface usually densely tomentose, margins entire or with small, callous teeth, petioles 1-2.5 cm long."

Qsn #	Question	Answer
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	No evidence

402	Allelopathic	
	Source(s)	Notes
	Inderjit, I., Kaur, S., & Dakshini, K. M. M. (1996). Determination of allelopathic potential of a weed <i>Pluchea lanceolata</i> through a multifaceted approach. Canadian Journal of Botany, 74(9): 1445-1450	[Allelopathy documented in genus] "The allelopathic potential of soils from four sites infested with the weed <i>Pluchea lanceolata</i> (DC.) C.B. Clarke (Asteraceae) was investigated. All sites had similar precipitation, similar crops, and weeds in addition to <i>P. lanceolata</i> . The objectives of this study were threefold: first, variations in the allelopathic effects of <i>P. lanceolata</i> infested soils on growth of three crops; second, soil phenolic content as a result of <i>P. lanceolata</i> infestation; and third, if the chemical characteristics and mycoflora of soils and biotic characteristics of <i>P. lanceolata</i> are responsible for the differences in allelopathic potential. Allelopathic effects of <i>P. lanceolata</i> infested soils were assessed on seedling growth of onion, cucumber, and turnip. Qualitative variation in the soil phenolic content from the four <i>P. lanceolata</i> infested sites was observed. No significant differences in soil mycoflora, soil nutrients, and <i>P. lanceolata</i> biotic characteristics were observed. Growth experiments showed mat crops demonstrated variation in allelopathic response to the soils from the four <i>P. lanceolata</i> infested sites. The present study indicates mat in natural field conditions, allelopathic potential of <i>P. lanceolata</i> varies because of agricultural practices specific to each site. Keywords: allelopathy, Asteraceae, interference, phenolics, soil nutrients, weed."

403	Parasitic	n
	Source(s)	Notes
	Flora of North America Editorial Committee. 2006. Flora of North America: North of Mexico. Magnoliophyta: Asteridae, part 6: Asteraceae, part 1. Oxford University Press, Oxford, UK	[No evidence in Asteraceae] "Subshrubs, 100–400 cm; tap-rooted."

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Motoooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	[Replaces forage, suggesting low palatability] "Environmental impact: Displaces forages in pastures and natives in natural areas."

405	Toxic to animals	n
-----	------------------	---

Qsn #	Question	Answer
	Source(s)	Notes
	Quattrocchi, U.. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	" <i>Pluchea carolinensis</i> " ... "A tea for cough, or for mouthwash to relieve toothaches."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Weaver, Jr., R.E. 2006. Botany Section. TRI-OLOGY 45(3): 1-12	" <i>Pluchea carolinensis</i> (cure for all) -- <i>Icerya rileyi</i> nr. Cockerell, a margarodid scale: A severe infestation was found on weeds at Port Everglades (Broward County; E2006-2627; Margarita A. Lahens and Eduardo M. Varona, USDA/APHIS/PPQ, William A. Thiel, Greg S. Hodges and Susan E. Halbert; 11 May 2006). NEW DPI HOST RECORD."
	Howard, F.W., Pemberton, R.W., Hodges, G.S., Steinberg, B., McLean, D. & Liu, H. 2006. Host Plant Range of Lobate Lac Scale, <i>Paratachardina lobata</i> , in Florida. Proceedings of the Florida State Horticultural Society 119: 398-408	"Table 1. (Continued) The host range of lobate lac scale, <i>Paratachardina lobata</i> , in southern Florida, species based on observations during 2002-2006, arranged in alphabetical order." [Wide host range includes <i>Pluchea carolinensis</i>]

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	[No evidence. Medicinal uses] "It has several herbal applications including aromatic baths, control of fever, treatment of uterine fibroids, relief of sore throat and stomach pain, poultices for wounds and skin ulcers, as an analgesic, and for the treatment of malaria (Balick and others 2000, Liogier 1990, Vélez and van Overbeek 1950). Analgesic and anti-inflammatory effects have been demonstrated in laboratory trials with rats (Gavilán-Yodú and Hechavarría 2002)."

Qsn #	Question	Answer
408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Smith, C.W. & Tunison, J.T. 1992. Fire and alien plants in Hawaii: research and management implications for native ecosystems Pp. 394-408 In Stone, C.P., Smith, C.W. & Tunison, J.T. (eds.). Alien Plant Invasions in Native Ecosystems of Hawaii: Management and Research. Cooperative National Park Resources Studies Unit, University of Hawaii, Honolulu	"Woody alien plants usually invade burned areas only to a limited degree and are typically early successional species. Alien shrubs such as partridge pea (<i>Chamaecrista nictitans</i>), indigo (<i>Indigofera suffruticosa</i>), sourbush (<i>Pluchea symphytifolia</i>), and yellow Himalayan raspberry (<i>Rubus ellipticus</i>) invade burned sites immediately after fire but appear to be early successional species."
	Pierce, A. D., McDaniel, S., Wasser, M., Ainsworth, A., Litton, C. M., Giardina, C. P., & Cordell, S. (2014). Using a prescribed fire to test custom and standard fuel models for fire behaviour prediction in a non-native, grass-invaded tropical dry shrubland. <i>Applied Vegetation Science</i> , 17(4): 700-710	[High fuel moisture contact in live plants, suggesting fire risk could be decreased] "Fuel moisture ranged from 8% for 1-hr dead woody fuels to 297% for live <i>P. symphytifolia</i> . In general, the highest fuel moistures were in live woody species (<i>P. symphytifolia</i> , <i>I. suffruticosa</i> , <i>L. camara</i> and <i>D. viscosa</i>)."

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"The species is intolerant and cannot endure overhead shade or severe competition from brush or grass."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"Cure-for-all is adapted to a wide variety of soils and sites. It tolerates excessively well to poorly-drained soils, the full range of soil textures, acid and alkaline reactions, salt and salt spray, and compaction."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Flora of North America Editorial Committee. 2006. Flora of North America: North of Mexico. Magnoliophyta: Asteridae, part 6: Asteraceae, part 1. Oxford University Press, Oxford, UK	"Subshrubs, 100–400 cm; tap-rooted. Stems matted-villous with viscid, vitreous hairs, proximally glabrescent, not evidently glandular."

412	Forms dense thickets	y
-----	----------------------	---

Qsn #	Question	Answer
	Source(s)	Notes
	US Fish and Wildlife Service. 2012. Endangered and Threatened Wildlife and Plants; Listing 15 Species on Hawaii Island as Endangered and Designating Critical Habitat for 3 Species; Proposed Rule. Federal Register / Vol. 77, No. 201: 63928-64018	"Pluchea spp. are 3- to 6-ft (1- to 2-m) tall, fast-growing shrubs that form thickets in dry habitats and can tolerate saline conditions. <i>Pluchea carolinensis</i> (sourbush) is native to Mexico, the West Indies, and South America (Wagner et al. 1999h, p. 351), and <i>Pluchea indica</i> (Indian fleabane), is native to southern Asia (Wagner et al. 1999h, p. 351)."
	Pratt, L. W., & Abbott, L. L. (1996). Distribution and abundance of alien and native plant species in Kaloko-Honokohau National Historical Park. Technical Report 103. Coop. Nat. Park Resources Studies Unit, University of Hawaii, Honolulu, HI	"Sourbush spread rapidly after its introduction, and within 30 years had invaded approximately 50,000 acres (Clausen 1978). The shrub is now established in lowland and coastal regions of all the main Hawaiian Islands. Fast growing and capable of forming dense thickets (Smith 1985), sourbush is particularly threatening to anchialine pools, where its abundant leaf litter leads to increased eutrophication and early senescence of pools (Chai et al. 1989). A tall shrub with large hairy leaves, sourbush produces clusters of small, pale pink or lavender flower heads; flowers develop into tiny, white-plumed dry fruits that are widely dispersed by wind."
	Smith, C.W. 1985. Impact of Alien Plants on Hawaii's Native Biota. Pp. 180-250 in Stone & Scott (eds.). Hawaii's terrestrial ecosystems: preservation & management. CPSU, Honolulu, HI	"This 1-2 m tall, fast-growing shrub forms thickets in dry habitats. The seeds are wind-dispersed."

501	Aquatic	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Terrestrial shrub] "Erect, many-branched, aromatic shrubs 15-40 dm tall" ... "in Hawai'i naturalized usually in relatively dry, coastal areas but ranging up to ca. 900 m in mesic to wet forest"

502	Grass	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	Asteraceae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	Asteraceae

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Erect, many-branched, aromatic shrubs 15-40 dm tall, glandular tomentose, sometimes merely glandular."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	[No evidence. Broad native and naturalized range] "Range.—Cure-for-all is native to Florida, Bermuda, the Bahamas, the West Indies, Mexico, Central America, and Colombia, Venezuela, and Ecuador in South America (Stevens and others 2001, Natural Resources Conservation Service 2002). The species has naturalized in Hawaii, Guam and other Pacific Islands, Taiwan, West Africa, and probably in many other places in the tropics (Peng and others 1998, Pacific Islands Ecosystems at Risk 2002, Stevens and others 2001)."

602	Produces viable seed	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Achenes dark brown, ca. 0.8 mm long, scarcely grooved, sparsely appressed whitish pubescent."
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"Cure-for-all blooms in spring and summer in Florida (Long and Lakela 1976) and produces seeds prolifically. A collection of seeds from Puerto Rico weighed an average of 0.000025 g/seed or 40 million seeds/kg."

603	Hybridizes naturally	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	" <i>Pluchea x josbergii</i> is a spontaneous hybrid occurring wherever <i>P. indica</i> and <i>P. symphytijolia</i> grow together."

Qsn #	Question	Answer
604	Self-compatible or apomictic	
	Source(s)	Notes
	Carr, G. D., King, R. M., Powell, A. M., & Robinson, H. (1999). Chromosome numbers in Compositae. XVIII. American Journal of Botany, 86(7): 1003-1013	" <i>Pluchea carolinensis</i> (Jacq.) Sweet" ... Chromosome number - 2n = 10"
	Burdon, J. J., & Marshall, D. R. (1981). Biological control and the reproductive mode of weeds. Journal of Applied Ecology 18(2): 649- 658	"TABLE 1. A worldwide list of projects for the biological control of weeds together with a list of the predominant means of reproduction of the target species." [<i>Pluchea odorata</i> - Functional monoecious]

605	Requires specialist pollinators	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"Although not specifically reported, as other members of the family, it probably provides a source of nectar and pollen for honeybees and other insects."
	Cate, C. A. (2007). Monitoring, assessing and evaluating the pollinator species (Hymenoptera: apoidea) found on a native brush site, a revegetated site and an urban garden. PhD Dissertation. Texas A&M University, College Station, TX	"Table 5. Valley Nature Center (the urban garden site) listing the plants in which each bee species were collected and plant species which comprises the plant collection" [<i>Apis mellifera</i> visits <i>Pluchea carolinensis</i>]
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[No evidence from floral morphology] "Heads in large, flat-topped inflorescences; involucre hemispherical, 4.5-6 mm high, the inner bracts pubescent on the outer face and margins ciliate; disk corollas pinkish lavender; pappus dull brownish white, consisting of a single series of 10-12 capillary bristles."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	[Seeds and resprouts from roots]. No evidence of vegetative spread "Cure-for-all blooms in spring and summer in Florida (Long and Lakela 1976) and produces seeds prolifically." ... "In Puerto Rico, most cure-for-all live for 2 to 4 years before dying or dying back to the root and resprouting. Sprouts grow about 1.5 m in the first year."

607	Minimum generative time (years)	
	Source(s)	Notes
	Smith, C.W. 1985. Impact of Alien Plants on Hawaii's Native Biota. Pp. 180-250 in Stone & Scott (eds.). Hawaii's terrestrial ecosystems: preservation & management. CPSU, Honolulu, HI	[Fast-growing, but time to maturity unspecified] "This 1-2 m tall, fast-growing shrub forms thickets in dry habitats."

Qsn #	Question	Answer
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Pacific Island Ecosystems at Risk (PIER). 2013. <i>Pluchea carolinensis</i> . http://www.hear.org/Pier/species/pluchea_carolinensis.htm . [Accessed 10 May 2015]	"Comments: This species (alone and together with <i>Pluchea indica</i>) seem to be highly correlated with military airfields constructed in the Pacific during World War II. Per Bill Sykes (pers. com.), "introduced accidentally to Motu Moananui [Penrhyn Island, Cook Islands] at the time that American engineers built the airstrip in the Second World War." Not common there. Abundant near American military bases built on Santo and Efate Islands in Vanuatu. (Warea Orapa, communication to Aliens listserver)."
	Space, J.C. & Imada, C.T. Report to the Republic of Kiribati on invasive plant species on the islands of Tarawa, Abemama, Butaritari and Maiana. USDA Forest Service & Bishop Museum, Honolulu, HI	" <i>Pluchea carolinensis</i> (te kaikare, te kare, sour bush) is found on Tarawa (along the airport and in areas to the south to and along the road to Temaiku) and on Butaritari (along the airstrip and main road). <i>Pluchea indica</i> (Indian fleabane, Indian pluchea, Indian camphorweed) is present on Butaritari, mostly near the coast. These are shrubby species with wind-dispersed seed. <i>Pluchea carolinensis</i> is naturalizing extensively on Tongatapu, Tonga, and is reported to be widespread but not presently abundant on Guam. These species may have been accidentally introduced as a result of military activity as both were also introduced to Penrhyn Island (Cook Islands) when an airfield was built there during the Second World War (Bill Sykes, pers. com.) and are commonly found in conjunction with other World War II airfields in the Pacific."

702	Propagules dispersed intentionally by people	
	Source(s)	Notes
	Native Seed Network. 2015. http://www.nativeseednetwork.org/viewtaxon?taxon_code=PLCA10 . [Accessed 11 May 2015]	"This seed is not currently available in the marketplace"
	Neal, M.C. 1965. In Gardens of Hawaii. Bishop Museum Press, Honolulu, HI	[Used ornamentally after introduction, although how widespread this use is today is unknown] "In Hawaii, the dried, empty, brown flower receptacles are used for leis and dry arrangements."
	WRA Specialist. 2015. Personal Communication	Some intentional planting and dispersal may occur, but as a widespread weed, this plant is probably not intentionally dispersed at this time (at least not in the Hawaiian Islands)

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	No evidence. Unlikely. Not grown commercially or with produce

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R. & Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"pappus dull brownish white, consisting of a single series of 10-12 capillary bristles. Achenes dark brown, ca. 0.8 mm long, scarcely grooved, sparsely appressed whitish pubescent."

Qsn #	Question	Answer
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"The seeds are wind-dispersed and probably require wet, bare soil to germinate and establish themselves."

705	Propagules water dispersed	
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	[Wind-dispersed, but distribution around water suggests secondary movement by water may be possible] "A minimum of about 1000 mm of mean annual precipitation is required in upland sites, but it grows in much drier climates along streams and near mangroves and marshes."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"The seeds are wind-dispersed and probably require wet, bare soil to germinate and establish themselves."

707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Adapted for wind dispersal, Unlikely to attach externally, but pappus may aid in adherence to fur or mud on animals] "pappus dull brownish white, consisting of a single series of 10-12 capillary bristles. Achenes dark brown, ca. 0.8 mm long, scarcely grooved, sparsely appressed whitish pubescent."

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. Plant Protection Quarterly, 25(2): 56-74	[Adapted for wind dispersal] "Answer 'no' where the taxon is unlikely to be eaten by animals or if seeds are not viable following passage through the gut."

801	Prolific seed production (>1000/m2)	
	Source(s)	Notes

Qsn #	Question	Answer
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	[Densities unknown] "Cure-for-all blooms in spring and summer in Florida (Long and Lakela 1976) and produces seeds prolifically. A collection of seeds from Puerto Rico weighed an average of 0.000025 g/seed or 40 million seeds/kg. Because the seeds failed to germinate on moist filter paper, it is not known whether this represents a reasonable estimate for the species (author's observation)."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Royal Botanic Gardens Kew. 2008. Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/ . [Accessed 11 May 2015]	"Storage Behaviour: Orthodox"
	Bakutis, A.C.L. 2005. Investigation seed dispersal and seed bank dynamics in Hawaiian mesic forest communities. MS Thesis. University of Hawaii, Honolulu	[Present in seed bank, but not seed rain or vegetation for 9 months, suggesting possible longer term persistence] "A total of 51,940 seedlings from 18 flowering plant species were found in 184 soil cores in native, edge and alien vegetation at Kalua'a from September 2003 to June 2004 (Table 3.1)." ... "Of the 13 alien species, four species, <i>Buddleia asiatica</i> , <i>Hypochoeris glabra</i> , <i>Pluchea symphytifolia</i> , and <i>Solanum americana</i> , were only found in the soil seed bank and not in the vegetation at the study site"

803	Well controlled by herbicides	y
	Source(s)	Notes
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Management: Sensitive to 1lb/acre 2,4-D, 0.5 lb/acre dicamba, and 0.25 lb/acre triclopyr. Readily controlled by 0.5 lb/acre triclopyr in drizzle applications(56). HAVO staff reported control with foliar application of glyphosate at 1% product. (Chris Zimmer, HAVO)."
	Motooka, P., Ching, L. & Nagai, G. 2002. Herbicidal Weed Control Methods for Pasture and Natural Areas of Hawaii. CTAHR free publication WC-8. CTAHR, UH Manoa, Honolulu, HI	"Weed species susceptible to drizzle-applied triclopyr include highbush blackberry, yellow Himalayan raspberry, catsclaw, Formosan koa, bur bush, sacramento bur, melastoma, Indian pluchea, and soubush."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO	"In Puerto Rico, most cure-for-all live for 2 to 4 years before dying or dying back to the root and resprouting. Sprouts grow about 1.5 m in the first year."
	Smith, C.W. 1985. Impact of Alien Plants on Hawaii's Native Biota. Pp. 180-250 in Stone & Scott (eds.). Hawaii's terrestrial ecosystems: preservation & management. CPSU, Honolulu, HI	"Its resistance to fire depends on the intensity of the fire. It generally regenerates from basal shoots."

Qsn #	Question	Answer
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	n
	<p style="text-align: center;">Source(s)</p> <p>Francis, J. K. (ed.). 2004. Wildland shrubs of the United States and its Territories: thamnisc descriptions: volume 1. Gen. Tech. Rep. IITF-GTR-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, San Juan, PR, & U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO</p> <p>Markin, G.P., Lai, P. & Funasaki, G.Y. 1992. Status of biological control of weeds in Hawaii and implications for managing ecosystems. Pp. 466-482 in Stone, C.P., Smith, C.W. & Tunison, J.T. (eds.). Alien Plant Invasions in Native Ecosystems of Hawaii: Management and Research. Cooperative National Park Resources Studies Unit, University of Hawaii, Honolulu</p> <p>Alyokhin, A. V., Messing, R. H., & Duan, J. J. (2001). Utilization of the exotic weed <i>Pluchea odorata</i> (Asteraceae) and related plants by the introduced biological control agent <i>Acinia picturata</i> (Diptera: Tephritidae) in Hawaii. <i>Biocontrol Science and Technology</i>, 11(6): 703-710</p> <p>Ramadan, M. M., Murai, K. T., & Johnson, T. 2011. Host range of <i>Secusio extensa</i> (Lepidoptera: Arctiidae), and potential for biological control of <i>Senecio madagascariensis</i> (Asteraceae). <i>Journal of Applied Entomology</i>, 135(4): 269-284</p>	<p style="text-align: center;">Notes</p> <p>"A seed insect, <i>Acinia picturata</i> (Diptera: Tephritidae), was introduced in Hawaii and although now well established, has had no significant effect on the shrub (Alyokhin and others 2001)."</p> <p>"Table 1. Introduction of insects and diseases for the biological control of weeds in Hawai'i.*" [<i>Pluchea symphytifolia</i> - Total species released = 2; Success of program = No detectable effect]</p> <p>"The flower-head feeding fly <i>Acinia picturata</i> (Diptera: Tephritidae) was deliberately introduced from Mexico into Hawaii in 1959 for biological control of the exotic weed <i>Pluchea odorata</i> (Snow) (Asteraceae). Neither field efficacy nor possible non-target effects of the fly have been evaluated in the 40 years since the introduction. We assessed the impact of the fly on both its target host and on seven non-target plant species. The impact on the target weed was limited, with only 5-13% of the developing seeds in <i>P. odorata</i> flowerheads being destroyed by larval feeding. We did not detect any host range expansion of <i>A. picturata</i> onto flowerheads of two exotic or 5 endemic non-target plant species in the family Asteraceae."</p> <p>[<i>Pluchea</i> are not suitable hosts] "<i>Secusio extensa</i> (Lepidoptera: Arctiidae) was evaluated as a potential biological control agent for Madagascar fireweed, <i>Senecio madagascariensis</i> (Asteraceae) ... The moth was introduced from southeastern Madagascar into containment facilities in Hawaii, and host specificity tests were conducted on 71 endemic and naturalized species (52 genera) in 12 tribes of Asteraceae and 17 species of non-Asteraceae including six native shrubs and trees considered key components of Hawaiian ecosystems. No-choice feeding tests indicated that plant species of the tribe Senecioneae were suitable hosts ..."</p>

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Widely naturalized
- A pasture and environmental weed, threatening endangered plant taxa in the Hawaiian Islands
- Other *Pluchea* species have become invasive
- Possibly unpalatable or of low forage value
- Forms dense thickets, excluding other vegetation
- Tolerates many soil types
- Reproduces by seed
- Hybridizes with invasive *Pluchea indica*
- Seeds dispersed by wind & accidentally due to human activity & movement of materials, equipment etc.
- Prolific seed production (densities unknown)
- Able to resprout from roots after die-back after fires
- No effective biological control agents present in the Hawaiian Islands. None known elsewhere

Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Non-toxic, with medicinal uses
- Shade-intolerant
- Not reported to spread vegetatively (but able to resprout)
- Herbicides provide effective control